

ment of all that is delightful in art, useful in industry, valuable to commerce, and essential to existence.

Hence the interest attaching to these publications of the United States Geological Survey, dry (paradoxical term!), statistical records for the most part, but none the less engrossing in their importance, and even entertaining at not infrequent intervals. Amid a voluminous mass of data, carefully and patiently collected from day to day and year to year, it is surely worthy a passing glance to note that the mean annual rainfall over the United States is 29.4 inches, that the heaviest precipitation occurs upon the North Pacific Coast, where, at several points in the States of Washington and Oregon, it exceeds 100 inches, while at the back of the coastal mountain ranges the rainfall diminishes rapidly southward, so that in the State of Nevada it ceases altogether, or is negligibly small. From another paper comes corroborative evidence on the value of afforestation, in that the data obtained clearly demonstrate the fact that an increase in floods is directly associated with the denudation of forest areas. Again, it is of considerable industrial importance to have an estimate of the total available water horse-power throughout the country. This is stated to lie between 200 and 250 millions, of which only 5½ millions have as yet been utilised. Yet again, from a geological point of view it is instructive to learn that the whole surface of the United States is being denuded at the rate of 1 inch in 760 years, representing an annual transportation of 270 million tons of dissolved matter and 513 million tons of suspended matter to tidal waters.

But the volumes are not merely academically and

day from some little eminence, and then stay by it till help comes. If you must depend on your own exertions, think carefully over all the possibilities and adopt a plan of action and adhere to it."

Excellent advice! but it is one thing to read it amid the bustle of a crowded city and another to act upon it in the lonely and fearful silence of the illimitable desert.

B. C.

SOME RECENT WORK ON TROPICAL MEDICINE.

TWO recent numbers of the *Annals of Tropical Medicine and Parasitology* (vol. iii., No. 2, October 20, and No. 3, November 1) contain six memoirs, of which four deal with problems relating to trypanosomes and the diseases caused by them. Messrs. Kinghorn and Montgomery discuss the important and difficult question of the flagellates found in the intestine and proboscis of tsetse-flies caught wild, on the basis of observations made by them during their expedition to the Zambezi, 1907-9. In *Glossina palpalis* collected by them on Matondwi Island, at the southern extremity of Lake Tanganyika, an island that has been uninhabited for twenty years, they found, out of 185 flies dissected, no fewer than seventy-eight, or 42.1 per cent., harbouring flagellates in the intestine, a percentage which far surpasses all previous records from other places; no parasites were found, however, in the proboscis. In *Glossina morsitans* collected near Kambole, about fifty miles west of Abercorn, nine out of 113 flies examined, or 7.8 per cent., were found infected with flagellates in the



Death Valley, looking north toward the Black Mountains.

statistically interesting. They have a human side, which at times is forcible in its suggestiveness. Here and there are touches of the grim reality of things, allusions at once startling and tragic, pictures which bring us face to face with the deadly antagonism to humankind of nature in her more savage aspects. Take, for instance, the pamphlet entitled "Some Desert Watering Places in California and Nebraska." Here are no descriptions of well-watered plains and fertile valleys, but vivid sketches of an arid, desolate region, comprising an area of 68,000 square miles, where "the scarcity of water and the importance of a knowledge of its whereabouts are indicated by the frequency with which the Press records instances of death from thirst in the more remote parts of the desert." The Death Valley region comprises plains which are absolute deserts, totally destitute of water and treeless for a space representing many days' journey. The following extract, under the head of "Getting Lost," gives a vivid sketch of the possibilities of a desert tragedy:—

"The inexperienced traveller often gets at once into a panic on losing his way, and wastes his remaining energy in frantic rushes in one direction and another. This tendency to become panic-stricken should be controlled, if possible. Sit down, get out your map and compass—if you are provided with them, as you should be—and study the situation carefully before acting. At least, rest a little and think it over. If it is hot and you are far from camp, get your head into the shade of a bush or rock, and wait till night. Thirst will be less intolerable then and endurance greater. If you have camp companions who are likely to look for you, start a signal fire by night or a smoke by

intestine, and seven out of thirty-one flies examined, or 21.2 per cent., were found to contain flagellates in the proboscis.

The authors give a detailed description of the parasites, but, unfortunately, without any figures; they consider that the flagellates observed in *G. palpalis* are to be referred to the type of *Trypanosoma grayi*, Novy, but they did not observe the encystment described by Minchin. The parasites observed in *G. morsitans* only differed slightly from those observed in *G. palpalis*. Feeding experiments were undertaken in order to trace, if possible, a development of the flagellates found in *G. palpalis*, and with rather surprising results, for while 42 per cent. of flies not fed artificially contained trypanosomes, in those fed only a very small proportion were found to harbour these parasites. It was also found that the percentage of intestinal infections tended to decrease when flies were kept in captivity, while, on the other hand, the percentage of infections of the proboscis tended to increase; but the number of cases examined is scarcely sufficient to support these conclusions.

The origin of the trypanosomes occurring in "wild" tsetse-flies is discussed, but without reaching very definite conclusions. The authors agree with Stuhlmann that the parasites in the proboscis are derived from those in the intestine, and they suggest the possibility that the trypanosomes found in "wild" tsetses "may be derived from pathogenic trypanosomes which lose for some unknown reason their infectivity when ingested," and also that they represent a mixed infection.

In two other memoirs the same authors report at length

on human trypanosomiasis in north-eastern Rhodesia and Nyasaland, and on trypanosomiasis of domestic stock in north-eastern Rhodesia. The reports contain much valuable information concerning the habits and occurrence of the species of *Glossina* and other biting flies, the various types of trypanosomes (illustrated by photomicrographs) met with in the blood of diseased domestic animals, and other important points, and the question of prophylactic measures against trypanosomiasis is discussed both for human beings and animals.

In another memoir Messrs. Breinl and Nierenstein give an account of their biochemical and therapeutical studies on trypanosomiasis. After a detailed account of their "observations on experimental trypanosomiasis, the treatment of infections with different pathogenic trypanosomes, and the mechanism of the therapeutical action of various trypanocidal compounds," they raise the question, "When can an animal be considered to be cured?" No very definite answer is given, however, to this question, and it is concluded that "the general condition of experimental animals influences to a large extent the results obtained in therapeutical experiments." The memoir ends with a brief discussion on the comparative value of experiments on different laboratory animals.

The two remaining memoirs are by Prof. John Cardamatis, on sanitary measures and malaria epidemics of Athens, and by H. B. Day and Prof. A. R. Ferguson, on a form of splenomegaly, with hepatic cirrhosis, endemic in Egypt. Both memoirs are illustrated by photographs.

In the *Annals of Tropical Medicine and Parasitology*, vol. iv., part iv., are published two reports of the expedition of the Liverpool School of Tropical Medicine to Jamaica. The first of these reports is by Mr. Robert Newstead, on the ticks and other blood-sucking Arthropoda of Jamaica. The author gives most interesting bionomical notes, as well as systematic descriptions, of these pests, and suggests measures to be taken for the extermination of ticks. The most active enemies of ticks were found to be birds, especially the tinkling grackle (*Quiscalus crassirostris*), the parrot-billed blackbird (*Crotophaga ani*), and the domestic fowl. In the stomach of *Crotophaga* there were also found specimens of the "green stink-bug" (*Loxa flavicollis*), an observation of great bionomical interest, since this insect, though possessed of an odour which is "horribly offensive," has a protective green coloration. The second report is by Dr. W. T. Prout, on malaria. After discussing the nature and etiology of the disease and its occurrence in Jamaica, the author gives an account of anti-malarial measures and their effects in Jamaica and elsewhere, and suggests practical means for combating the disease.

PRODUCTION AND UTILISATION OF MOLASSES.

THE production of molasses is an important factor in the cane-sugar industry, and has received a good deal of attention in sugar-growing countries. Molasses constitute the thick mother liquor left after the sucrose has crystallised out, and, no matter what artifice be adopted, there is a point beyond which it seems impossible to obtain any more crystals, the sugar being held back by the foreign bodies present. Hertzfeld has shown that the formation of beet-sugar molasses is due to the mineral matter originally present in the juice, or added in the liming process, reacting with the sucrose to form non-crystallisable compounds. Prinsen Geerligs has proved that similar compounds are formed in working up cane sugar. The problem is complicated here by the presence of glucose, which reacts more readily with the mineral substances than does sucrose. In this way is explained the definitely established fact that, the larger the proportion of glucose to mineral matter, the greater the recovery of sugar is likely to be. There appears also to be a physical factor involved; gummy matter is always present, which apparently coats the small crystals and prevents their growth.

The whole subject is discussed very fully in an illuminating article in a recent issue of the *Agricultural News*, one of the publications of the West Indian Department of Agriculture. It is further pointed out that during

the past season the muscovado molasses of Antigua and Barbadoes, and to a lesser extent of other West Indian islands, has obtained a remarkably high market price, higher, indeed, than the value of the sucrose present. The chief consumers seem to have been the fishermen and lumbermen on the North American continent. There has been a simultaneous rise in the market value of the exhausted vacuum-pan molasses of Antigua. The problem of storage, therefore, assumes considerable importance; it is complicated by certain bacterial changes which are very liable to set in. But these changes are not inevitable, and with greater care in the manufacture the "souring" which so greatly reduces the market value can be to a large extent avoided. The composition of the various grades of molasses is given as follows:—

	Muscovado molasses (Antigua) per cent.	Centrifugalled first molasses per cent.	Centrifugalled second molasses (exhausted) per cent.
Sucrose ...	50 to 55	40 to 60	20 to 40
Glucose ...	5, 15	7, 20	15, 40
Non-sugar ...	3, 8	—	—
Ash ...	3, 5	3, 6	3, 10
Water ...	24, 30	25, 28	17, 28

The first molasses can be made to yield a further crop of cane sugar by re-boiling, but the second molasses cannot, and are therefore said to be exhausted.

The problem in Hawaii is very different in character. The molasses obtained there are not of the muscovado type, and consequently have no commercial value as human food. It is estimated that something like fifteen million gallons are obtained annually, of which about ten millions are used as food for stock. There is little doubt that this would be the most economical way of utilising the remainder, but unfortunately, the number of stock kept on the islands is insufficient for the purpose. Of the other twenty million gallons some is burnt as fuel, some is put on the land as fertiliser, and some is run into the sea and wasted. Decided benefit has followed the use of molasses as fertiliser in Mauritius, and there is some reason to suppose that the sugar increased the amount of nitrogen fixation in the soil; in consequence, the manurial value is higher than one would expect from a consideration merely of the amount of nitrogen and mineral matter present. These favourable results, however, are not obtained in Hawaii, and experiments have been instituted at the Experiment Station of the Hawaiian Sugar-planters' Association to find out whether molasses could profitably be converted into alcohol. Something more than 50 per cent. of sugar is present, of which 83 per cent. can be converted by fermentation into alcohol. The effect of varying conditions has been investigated and the native yeasts described.

THE AUSTRALIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE Australian Association for the Advancement of Science held its inaugural meeting in Sydney in September, 1888, and met there again in 1898; in January, 1890, it visited Melbourne, and again in 1901; since then sessions have been twice held at Adelaide, Hobart, and Brisbane, and once at Christchurch and once at Dunedin, in New Zealand; its next meeting will be held in Sydney in 1911.

As a rule, the meetings have been held in the capitals of the Australian States at intervals of ten years; as the inland towns like Bathurst and Ballarat become larger and better able to provide the requisite meeting-rooms and other accommodation, they will also be visited.

One great disadvantage under which the association suffers is the very great distances which the members have to travel; the nearest meeting-places are between 500 and 600 miles apart, so that members living in Brisbane, Melbourne, and Hobart have to travel those distances to attend a meeting in Sydney, and members from South Australia and New Zealand have to travel about 1200 miles, and those from Western Australia nearly 2500 miles; when the meeting is in New Zealand all the Australian members have to undergo a sea voyage of about five days at least, and some a longer one, with perhaps some hundreds of miles of railway travelling in addition.